Public Health Implications of Dust Explosions Using Chemical Incident Surveillance System Data

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ABSTRACT

Dust explosions can result in serious injuries and death. Damage to facilities and subsequent down time can have a negative financial impact. Dust explosions generally are initiated by a rapid release of heat due to a chemical reaction. Various materials can cause dust explosions such as natural organics (e.g., grain); synthetic materials (e.g., plastics); coal and peat; and metals (e.g., aluminum). A variety of industries are prone to dust explosions including wood processing, metals manufacturing and storage of metals, chemical or plastic production, coal, pharmaceutical plants and production or storage of sugar, starch, spices and similar food materials.

In developed countries, systematic records of dust explosions have been available since the early 20th century. However, not all incidents are captured because some may be minor or not be reported in the media. Furthermore, the incidents that are captured do not necessarily focus on public health implications (e.g., morbidity, mortality, evacuations).

We queried Agency for Toxic Substance Disease Registry’s Hazardous Substances Emergency Events Surveillance system (from 2005-2009) and the National Toxic Substance Incidents Program (from 2010-2011) for dust explosion/fire incidents.

During this time, 11 dust explosions or fires were reported. A total of 872 people were evacuated in four incidents. Five incidents resulted in 24 injured persons; of those 37.5 % were treated at the hospital but not admitted. The most frequently reported injuries/symptoms were gastrointestinal problems and dizziness. A majority of the dust explosions (54.5%) occurred in metal, electrical, transport, and professional manufacturing industries. The number of people living within a quarter of a mile of the incidents ranged from 0 to 1,963, suggesting that various communities could be adversely impacted by such events.

Understanding the public health implications of dust explosions is important for preventing morbidity and mortality when incidents occur. Even though the majority of these incidents occurred in industrial settings, a myriad of people lived in close proximity. It is important to be aware of potential vulnerable areas and populations and put plans in place to ensure community safety.